What is claimed is:

1. A method for controlling a powder press, said method comprising the steps of:

controlling an introduction of a powder material into a die;

controlling a creation of a substantially uniform distribution of powder material in the die; and

controlling a pressing of the powder material in the die by controlling a magnitude of a pressing force applied by each of at least one set of workpiece-forming punches and by controlling a position of each set of workpiece-forming punches relative to the die.

2. The method as claimed in claim 1 wherein the step of controlling an introduction of the powder material comprises the step of controlling a weight of the powder material introduced into the die.

3. The method as claimed in claim 2 wherein the step of controlling the weight of the powder material introduced into the die comprises the steps of controlling a weight of a first powder material to be introduced into the die and controlling a weight of a second powder material to be introduced into the die.

4. The method as claimed in claim 1 wherein the step of controlling an introduction of the powder material comprises the step of controlling a temperature of the powder material to be introduced into the die.

5. The method as claimed in claim 1 wherein the step of controlling a creation of a substantially uniform distribution of powder material in the die comprises controlling a fluidization of the powder material within the die.

6. The method as claimed in claim 5 further comprising the step of heating a

pressurized gas used to fluidize the powder material within the die.

7. The method as claimed in claim 1 wherein the step of controlling the pressing of the powder material in the die by controlling a magnitude of a pressing force applied by each set of workpiece-forming punches comprises controlling a pressure of a fluid provided to each of at least one piston that is operatively associated with each set of workpiece-forming punches.

8. The method as claimed in claim 1 wherein the step of controlling the pressing of the powder material in the die by controlling a magnitude of a pressing force applied by each set of workpiece-forming punches comprises the steps of determining a pressure of a fluid provided to each of at least one piston that is operatively associated with each set of workpiece-forming punches, comparing the pressure of the fluid provided to each piston to a pressure corresponding to a desired pressing force, and adjusting the pressure of the fluid provided to each piston based upon a result of the comparing step.

9. The method as claimed in claim 8 wherein the step of adjusting the pressure of the fluid provided to each piston comprises adjusting the pressure of the fluid provided to each piston such that the workpiece-forming punches form a workpiece having a substantially uniform density.

10. The method as claimed in claim 1 wherein the step of controlling the pressing of the powder material in the die by controlling a position of each set of workpiece-forming punches relative to the die comprises the steps of determining a position of each set of workpiece-forming punches, comparing the position of each set of workpiece-forming punches to a desired position, and adjusting a rate of travel of each set of workpiece-forming punches based upon a result of the comparing step.

11. The method as claimed in claim 1 wherein the step of controlling the pressing of the powder material in the die further comprises controlling a position of a first set of workpiece-forming punches relative to the die, and controlling a second set of workpiece forming punches relative to the die.

12. The method as claimed in claim 1 wherein said step of controlling the pressing of the powder material in the die comprises controlling the pressing of the powder material such that a finished part does not crack upon ejection, said controlling comprising the steps of:

pressing the powder material to a desired position; and

gradually reducing the pressing force applied by each of at least one set of workpiece-forming punches while maintaining the workpiece forming punches in a substantially fixed position such that the finished part is fully supported at all times prior to ejection; and

ejecting the finished part.

13. The method as claimed in claim 1 wherein said step of controlling the lubrication of the die cavity comprises the steps of:

creating an enclosed die cavity;

introducing a lubricant into the die cavity; and

draining the lubricant from the die cavity.

14. A control system for controlling a hydraulic press having a die, at least two separate sets of workpiece forming punches, and at least two hydraulic pistons, wherein each hydraulic piston is operatively associated with one set of workpiece-forming punches, said system comprising:

means for controlling a magnitude of a pressing force applied by each set of workpiece-

forming punches; and

means for controlling a position of each set of workpiece-forming punches relative to the die.

15. The control system as claimed in claim 14 wherein the means for controlling a magnitude of a pressing force applied by each set of workpiece-forming punches comprises:

at least two pressure sensors, said pressure sensors being in fluid communication with a fluid provided to each piston and being adapted to measure a difference in the pressure of the fluid provided to each of a first side and a second said of the piston;

an adjustable hydraulic valve for controlling a flow of the fluid to the first side and the second said of the piston; and

at least one controller in communication with each adjustable hydraulic valve and the pressure sensors for accepting a signal from the pressures sensors and adjusting a position of the adjustable hydraulic valve based upon the signal in order to control the pressure of the fluid provided to the first side and the second side of the piston.

16. The control system as claimed in claim 15 further comprising a computer in communication with each controller, wherein the computer comprises a processor and a memory onto which is stored a computer program, the computer program comprising means for sending at least one mode command to each controller and means for receiving a completion signal from each controller when the mode command has been completed by the controller.

17. The control system as claimed in claim 16 wherein the mode command comprises data necessary for each controller to adjust the pressure of the fluid provided to each piston such that the workpiece-forming punches form a workpiece having a substantially uniform density,

the data being chosen from a group consisting of position data, time data and pressure data.

18. The control system as claimed in claim 14 wherein the means for controlling a position of each set of workpiece-forming punches relative to the die comprises:

at least one position sensor disposed relative to the each set of workpiece-forming punches such that a position of each set of workpiece-forming punches may be determined;

at least one fluid valve for controlling a flow of a fluid provided to and extracted from each piston; and

at least one controller in communication with each fluid valve for controlling the flow of fluid provided to each piston.

19. The control system as claimed in claim 18 further comprising a computer in communication with each controller, wherein the computer comprises a processor and a memory onto which is stored a computer program, the computer program comprising means for sending at least one mode command to each controller and means for receiving a completion signal from each controller when the mode command has been completed by the controller.

20. The control system as claimed in claim 14 wherein the hydraulic press is a hydraulic powder press, and wherein the control system further comprises a means for controlling an introduction of a powder material into the die.

21. The control system as claimed in claim 20 wherein the means for controlling an introduction of a powder material into the die comprises a means for controlling a weight of the powder material introduced into the die.

22. The control system as claimed in claim 21 wherein the means for controlling the weight of the powder material introduced into the die comprises:

at least one weight scale;

at least one hopper containing a powder material;

at least one hopper valve for controlling a flow of the powder material from the hopper to the weight scale; and

at least one controller in communication with each hopper valve and each weight scale, wherein the controller controls a position of the hopper valve based upon a signal received from said weight scale.

23. The control system as claimed in claim 22 further comprising a computer in communication with each controller, wherein the computer comprises a processor and a memory onto which is stored a computer program, the computer program comprising means for sending at least one weight set point to said controller and means for accepting a signal from said controller corresponding to an actual weight of said powder.

24. The control system as claimed in claim 20 wherein the means for controlling an introduction of a powder material into the die comprises a means for controlling a temperature of the powder material.

25. The control system as claimed in claim 24 wherein the means for controlling the temperature of the powder material introduced into the die comprises:

at least one heating element for heating the powder material;

at least one temperature sensor for sensing a temperature of the powder material; and

at least one temperature controller for controlling a temperature of the powder material.

26. The control system as claimed in claim 25 wherein said at least one temperature controller is a computer in communication with each temperature sensor and each temperature

controller, wherein the computer comprises a processor and a memory onto which is stored a computer program, the computer program comprising:

computer program means for accepting an input from the temperature sensor corresponding to a temperature of the powder material;

computer program means for comparing the temperature of the powder material with a desired temperature;

computer program means for determining how to adjust the temperature of the powder material based upon a result of the comparison between the temperature of the powder material and the desired temperature; and

computer program means for sending an output to each heating element to control the temperature of the powder material.

27. The control system as claimed in claim 20 wherein the means for controlling an introduction of a powder material into the die comprises means for controlling a creation of a substantially uniform distribution of powder material in the die.

28. The control system as claimed in claim 27 wherein the means for controlling a creation of a substantially uniform distribution of powder material in the die comprises a means for controlling a fluidization of the powder material within the die.

29. The control system as claimed in claim 28 wherein the means for controlling a fluidization of the powder material within the die comprises:

a source of powder material;

a first valve in communication with the source of powder material;

a source of pressurized gas;

a pressure regulator in fluid communication with the source of pressurized gas;

a second valve in fluid communication with the source of pressurized gas and the pressure regulator; and

a branch connection in fluid communication with the source of powder material, the source of pressurized gas, the pressure regulator, the first valve, the second valve, and the die.

30. The control system as claimed in claim 29 wherein the means for controlling the fluidizer is computer having a processor and a memory onto which is stored a computer program, said computer program comprising:

computer program means for opening said first valve to allow a flow of powder from the source of powder material;

computer program means for closing said second valve to shut off a flow of air into the branch connector;

computer program means for closing said first valve to seal the source of powder from the branch connector;

computer program means for opening the second valve to allow pressurized air to enter the branch connector and flow into the die cavity; and

computer program means for controlling the pressure regulator and the second valve such that the pressurized gas is pulsed in such a manner as to cause the powder to be fluidized within the die.

31. The control system as claimed in claim 30 wherein said means for controlling a fluidization of the powder material within the die further comprises a heater and a temperature sensor and wherein said control system further comprises means for adjusting a temperature of

the pressurized gas.

32. The control system as claimed in claim 14 further comprising a means for controlling a lubrication of the die cavity.

33. The control system as claimed in claim 32 wherein the means for controlling the lubrication of the die cavity comprises:

a source of a lubricant;

a lubricant fill valve attached to the source of lubricant such that a flow of lubricant from the source may be controlled;

a lubricant drain valve attached to the die such that a flow of lubricant from the die may be controlled; and

a means for controlling the filling of, and draining of the lubricant from, the die.

34. The control system as claimed in claim 33 wherein the means for controlling a position of each set of workpiece forming punches comprises at least one controller, and wherein the means for controlling the filling of, and draining of the lubricant from, the die comprises a computer having a processor and a memory onto which is stored a computer program, the computer program comprising:

computer program means for sending an mode command to each controller to move each set of workpiece-forming punches in such a manner that an enclosed die cavity is formed;

computer program means for controlling the lubricant fill valve such that the lubricant is introduced into the die; and

computer program means for controlling the lubricant drain valve to drain the lubricant from the die.

35. A computer program product for controlling a hydraulic press system having a die, at least one set of workpiece forming punches, at least one hydraulic piston operatively associated with each of the at least one set of workpiece-forming punches, a means for adjusting a magnitude of a pressing force applied by each of the at least one set of workpiece-forming punches, a means for adjusting a position of each of the at least one set of workpiece-forming punches relative to the die, and a computer in communication with the means for controlling the magnitude of force and the means for controlling the position of each set of workpiece-forming punches, wherein the computer program product is coded to run on the computer and comprises:

computer program means for directing the computer to send an output to the means for adjusting the magnitude of the pressing force such that the magnitude is adjusted to a desired magnitude; and

computer program means for directing the computer to send an output to the means for adjusting the position of each set of workpiece-forming punches such that each of the at least one set of workpiece-forming punches is moved to a desired position within the die.

36. The computer program product as claimed in claim 35, wherein the press system further comprises at least one pressure sensor in fluid communication with a fluid provided to each piston and adapted to measure a pressure difference between fluid provided to a first side of each piston and to a second side of each piston, and wherein the means for adjusting a pressing force of each set of punches is an adjustable hydraulic valve for controlling a flow of the fluid to the first side and the second said of the piston and at least one controller in communication with each adjustable hydraulic valve and each pressure sensor for accepting a signal from the pressures sensors and adjusting a position of the adjustable hydraulic valve based upon the signal

in order to control the pressure of the fluid provided to the first side and the second side of the piston,

wherein the computer program product further comprises computer program means for sending at least one mode command to each controller and computer program means for receiving a completion signal from each controller when the mode command has been completed by the controller.

37. The computer program product as claimed in claim 35 wherein the computer program means for directing the controller to adjust the pressure difference between a first side of each piston and a second side of each piston such that the pressure difference corresponds to the desired pressing force comprises computer program means for sending a mode command comprising data necessary for each controller to adjust the pressure of the fluid provided to each piston such that the workpiece-forming punches form a workpiece having a substantially uniform density, the data being chosen from a group consisting of position data, velocity data and pressure data.

38. The computer program product as claimed in claim 35, wherein the press system further comprises at least one position sensor disposed relative to the set of workpiece-forming punches such that a position of each set of workpiece-forming punches may be determined, and wherein the means for adjusting a position of each set of punches is at least one fluid valve for controlling a flow of a fluid provided to and extracted from each piston and at least one controller in communication with each fluid valve for controlling the flow of fluid provided to each piston; wherein the computer program product further comprises computer program means for sending at least one mode command to each controller and computer program means for

receiving a completion signal from each controller when the mode command has been completed by the controller.

39. The computer program product as claimed in claim 35, wherein the hydraulic press system is a hydraulic powder press system, and wherein the press system further comprises at least one weight scale in communication with the computer, at least one hopper containing a powder material, at least one hopper valve for controlling a flow of powder material from the hopper to the weight scale, and at least one controller in communication with the computer, the weight scale and each hopper valve; wherein the computer program product further comprises computer program means for sending at least one weight set point to said controller and computer program means for accepting a signal from said controller corresponding to an actual weight of said powder.

40. The computer program product as claimed in claim 35, wherein the hydraulic press system is a hydraulic powder press system, and wherein the press system further comprises at least at least one heating element for heating the powder material, at least one temperature sensor in communication with the computer for sensing a temperature of the powder material, and at least one temperature controller in communication with the computer and the heating element; wherein the computer program product further comprises:

computer program means for directing the computer to accept an input from the temperature sensor corresponding to a temperature of the powder material;

computer program means for directing the computer to compare the temperature of the powder material with a desired temperature;

computer program means for directing the computer to determine how to adjust the

temperature of the powder material based upon a result of the comparison between the temperature of the powder material and the desired temperature; and

computer program means for directing the computer to send an output to each heating element to control the temperature of the powder material.

41. The computer program product as claimed in claim 40 wherein the press system further comprises at least at least one cooling element for cooling at least one hydraulic piston, at least one temperature sensor in communication with the computer for sensing a temperature of the hydraulic piston, and at least one temperature controller in communication with the computer and the cooling element; wherein the computer program product further comprises:

computer program means for directing the computer to accept an input from the temperature sensor corresponding to a temperature of the hydraulic piston;

computer program means for directing the computer to compare the temperature of the hydraulic piston with a desired temperature;

computer program means for directing the computer to determine how to adjust the temperature of the hydraulic piston based upon a result of the comparison between the temperature of the hydraulic piston and the desired temperature; and

computer program means for directing the computer to send an output to each cooling element to control the temperature of the hydraulic piston.

42. The computer program product as claimed in claim 35, wherein the hydraulic press system is a hydraulic powder press system, wherein the press system further comprises means for controlling a fluidization of the powder material within the die comprising a source of powder material, a source of pressurized gas, a pressure regulator in fluid communication with

the source of pressurized gas, a valve in fluid communication with the source of pressurized gas and the pressure regulator, and a branch connection in fluid communication with the source of powder, the source of pressurized gas, the pressure regulator, the valve and the die, and wherein the computer program product comprises:

computer program means for opening said first valve to allow a flow of powder from the source of powder material;

computer program means for closing said second valve to shut off a flow of air into the branch connector;

computer program means for closing said first valve to seal the source of powder from the branch connector;

computer program means for opening the second valve to allow pressurized gas to enter the branch connector and flow into the die cavity; and

computer program means for controlling the pressure regulator and the second valve such that the pressurized air is pulsed in such a manner as to cause the powder to be fluidized within the die.

43. The computer program product as claimed in claim 42 wherein the means for controlling a fluidization of the powder material within the die further comprises at least one heater for heating the pressurized gas, at least one temperature sensor in communication with the computer for sensing a temperature of the pressurized gas, and at least one temperature controller in communication with the computer and the heating element, wherein the computer program product further comprises:

computer program means for directing the computer to accept an input from the

temperature sensor corresponding to a temperature of the pressurized gas;

computer program means for directing the computer to compare the temperature of the pressurized gas with a desired temperature;

computer program means for directing the computer to determine how to adjust the temperature of the pressurized gas based upon a result of the comparison between the temperature of the pressurized gas and the desired temperature; and

computer program means for directing the computer to send an output to the at least one heater to control the temperature of the pressurized gas.

44. The computer program product as claimed in claim 35, wherein the hydraulic press system is a hydraulic powder press system, and wherein the press system further comprises a source of a lubricant, a lubricant fill valve attached to the source of lubricant such that a flow of lubricant from the source may be controlled, a lubricant drain valve attached to the die such that a flow of lubricant from the die may be controlled, a controller in communication with the computer, the lubricant fill valve and the lubricant drain valve; wherein the computer program product further comprises:

computer program means for directing the computer to send an output to the means for adjusting the position of each set of workpiece-forming punches to move each set of workpiece such that an enclosed die cavity is formed;

computer program means for directing the computer to send an output to the controller to open the lubricant fill valve such that the lubricant is introduced into the enclosed die cavity; and

computer program means for directing the computer to send an output to the controller to open the lubricant drain valve to drain the lubricant from the die.

45. The computer program product as claimed in claim 35 further comprising computer program means for directing the computer to produce a graphical user interface on a display, said graphical user interface being adapted to allow a user to vary a plurality of data structures utilized by the computer program product.

46. An article of manufacture comprising:

a computer readable memory for providing an input to a computer program for controlling a hydraulic press system; and

at least force two mode data structures stored upon the computer readable memory, wherein each of the at least two mode data structures comprises force data corresponding to a desired force to be applied by a set of workpiece forming punches, position data corresponding to a desired position of the set of workpiece forming punches, and velocity data corresponding to a desired velocity of the set of workpiece forming punches;

wherein the mode data structures are formatted such that the mode data structures are readable by a controller when transmitted to the controller by the computer program.

47. The article of manufacture as claimed in claim 46, further comprising at least one weight data structure stored upon the computer readable memory, wherein the weight data structure is formatted such that the weight data structure is readable by a controller when transmitted to the controller by the computer program.

48. The article of manufacture as claimed in claim 47, further comprising at least one cycle time data structure, wherein said cycle time data structure is readable by the computer program.

49. The article of manufacture as claimed in claim 45, further comprising at least one

temperature data structure, wherein said cycle time data structure readable by a controller when transmitted to the controller by the computer program.

50. A press system comprising:

a top portion comprising a first plurality of hydraulic cylinders containing a first plurality of workpiece forming punches;

a bottom portion comprising a second plurality of hydraulic cylinders containing a second plurality of workpiece forming punches, and

a central die portion comprising a top plate and bottom plate;

wherein said top portion is attached to said top plate of said die portion via a first set of bolts; and

wherein said bottom portion is attached to said bottom plate of said die portion via a second set of bolts.

51. A press system comprising:

a die;

at least one workpiece forming punch positioned to enter the die during operation;

at least one punch holder attached to said at least one workpiece forming punch;

at least one hydraulic piston comprising a piston rod in communication with the at least one punch holder and a hydraulic cylinder;

a first heater in thermal communication with the die; and

a second heater in thermal communication with the at least one punch holder;

52. The press system as claimed in claim 51 further comprising at least one thermocouple in thermal communication with the die and control means for controlling a

temperature of the die based upon a signal from the thermocouple.

53. The press system as claimed in claim 52 further comprising at least one cooling manifold in thermal communication with the punch holder.

54. The press system as claimed in claim 53 further comprising a means for preheating a powder introduced into the die.

55. The press system as claimed in claim 51 wherein said first heater and said second heater are adapted to heat the die and workpiece forming punch to a temperature of between 1200 and 1500 degreed Fahrenheit.